

## Confronting the Environmental Challenge of Electronic Waste through Reuse and Recycling

By Chris Knopp and Shawn Williams

**Electronic waste is one of the fastest growing waste streams in the developed world, igniting a disposal crisis with environmental, health, fiscal, and human rights implications. We discuss the need to manage used electronics responsibly and how a disciplined corporate reuse and recycling policy can help protect the global natural and human environment—and your corporate brand.**

### Core Topic

The ever-growing numbers of obsolete electronic equipment is creating a major e-waste problem globally that is affecting the human and natural environment, especially of developing countries.

A higher standard of “reuse first, responsible recycling second” is needed to help resolve the mounting accumulation of waste and minimize the impact on the global environment.

### Key Issues

- Currently businesses and other organizations that recycle or dispose of their electronic equipment are confused about the applicability of hazardous waste management requirements.
- Common practice among US businesses has been dumping obsolete electronic equipment in developing countries where environmental and worker legislation is lax or nonexistent and labor is cheap.
- More legislation and regulations must be passed and compliance enforced.

The exponential growth of new technology continues to be a beacon of our global economy and a necessity for every major industry. But there is a dark side to the innovation produced by the high-tech industry. For one, the equipment has been manufactured with little regard for long-term financial, environmental, or health impacts. For another, the continuous innovation that brings new technologies to market every few months has brought with it the interrelated consequences of rapid obsolescence. While much of the tidal wave of PC obsolescence facing the United States today can be attributed to the record number of PCs purchased in 1999 in response to Y2K concerns, we continue to compound the issue with premature retirement of re-usable assets. That obsolescence has contributed greatly to the staggering amount of scrap in landfills.

Figures for the future are, at best, staggering. According to recent Environmental Protection Agency (EPA) and National Safety Council estimates, approximately 250 million computers will become obsolete by 2005 and 500 million by 2007. Computer Takeback Campaign predicts the e-waste problem will continue to grow at an accelerated rate. They expect US consumers in all sectors to purchase close to 58 million new computer systems in 2006, rendering their older systems obsolete.

Regions all across the globe are faced with the problem of e-waste disposal. The sheer volume of the e-waste is just one part of the issue. An overwhelming lack of knowledge about proper recycling and disposal is another. It has been proven that electronics can present an environmental hazard if disposed of improperly. Yet, much recycling and disposal today is carried out with little or no concern for the global human or natural environment.

When the US economy suffered a downturn, businesses cut IT spending, including that apportioned for proper disposal. Often

## Strategic Planning Assumptions

### Planning Assumption 1

Environmental concerns make zero landfill tolerance an imperative and zero waste an achievable long-term goal.

- a. Zero landfill tolerance means that everything generated has a raw or base metal value and everything removed is reused.
- b. Zero waste is the transformation of the industrial production system to facilitate recycling all materials back into nature or the marketplace in a manner that protects human health and the environment.

### Planning Assumption 2

There is a cost for responsible and accountable electronics recycling.

- a. Companies must factor the expense into the total cost of ownership. (TCO)
- b. Companies must measure the expense of electronics recycling against the potential costs of penalties, litigation, negative publicity, or data security breaches resulting from improper e-waste disposal.

### Planning Assumption 3

There is a compelling need to focus on improving environmental impact.

- a. Achieve Improvements by extending the life of electronic equipment through upgrades and reuse and recycling old electronics.
- b. Contract for end-of-life options with a vendor who has signed the Electronic Recycler's Pledge of True Stewardship and who has measurements in place to prove it does not engage in sham recycling.

end-of-life equipment got tossed in the trash, ending up in landfills or being incinerated, setting free pollutants that contaminate the air, water, and soil. In the landfills, they leak and corrode, "sharing" with the environment highly toxic substances, exposure to which can result in serious health problems.

More conscientious businesses disposed of the waste by sending it out to be "recycled." Many turned to inexpensive disposal vendors who promised to remove their headache for little or no fee—and whose recycling practice commonly consisted of exporting e-waste overseas. Often these vendors did not have sufficient liability coverage to fulfill their promise of legal indemnification (transfer of liability), rendering the business itself accountable for any legal liabilities that arose.

Businesses today must meet the IT asset disposal challenge with keen awareness that corporate accountability for electronics disposal increases and is magnified each day as new and more stringent environmental and privacy legislation is passed and greater awareness is generated in the global press and by advocacy groups. Those that continue to turn a blind eye to unscrupulous disposal practices will be faced with significant financial, social, and environmental consequences for their actions, including irreparable damage to corporate brand and shareholder value.

Businesses must change their mindset from disposal as an expedient to reuse whenever possible and responsible recycling—as opposed to disposal—as a last resort. This need and approach is supported by the US Environmental Protection Agency (EPA) and such environmental activist groups as Basel Action Network (BAN) and Silicon Valley Toxics Coalition (SVTC).

## A MATTER OF GROWING CONCERN—IRRESPONSIBLE DUMPING OF E-WASTE OVERSEAS

As early as 1989, a United Nations environmental treaty, the Basel Convention, called for a total block on the export of all hazardous waste from rich to poor countries for any reason, including recycling. Ultimately, the Basel Ban was adopted, promising an end to the export of hazardous waste by December 31, 1997. The United States is the only developed country in the world that does not control or prohibit toxic trade and has not ratified the Basel Convention.

Both BAN and SVTC have accused the United States of dealing with the electronic waste problem by making use of "hidden escape valves to export the crisis to developing countries of Asia." According to James Puckett, BAN coordinator and co-



**Basel Action Network (BAN)** is a global network of organizations advocating global environmental justice and working to (1) prevent “toxic trade” in toxic wastes, products, and technologies exported from rich to poorer countries and (2) ensure national self-sufficiency in waste management through clean production and toxics use reductions. To learn more about BAN, visit [www.ban.org](http://www.ban.org).



**Silicon Valley Toxics Coalition (SVTC)** is a diverse grassroots organization working to promote a clean electronics industry and a sustainable world where a healthy environment is a right. SVTC champions empowerment of people locally, nationally, and globally. To learn more about SVTC, visit [www.svtc.org](http://www.svtc.org).



**Computer TakeBack Campaign (CTBC)** is a coalition of activist organizations, including BAN and SVTC, focused on the environmental and social impacts of the electronics industry. Dedicated to protecting the health and well-being of electronics users, workers, and communities where electronics are produced and discarded, CTBC calls for consumer electronics manufacturers and brand owners to be accountable for the lifecycle of their products. To learn more about the CTBC, visit [www.computertakeback.com](http://www.computertakeback.com).

author of “Exporting Harm: The High-Tech Trashing of Asia,” US policy is to continue to export its problems rather than solve them at home. The controversial “Exporting Harm” report on the export of US e-waste to developing countries, released in 2002 by BAN and SVTC, claimed that 50-to-80 percent of the e-waste collected in the United States and destined for “recycling” was exported to developing countries for disassembling. (See the full report at [www.svtc.org/cleancc/pubs/technotrash.pdf](http://www.svtc.org/cleancc/pubs/technotrash.pdf).)

The situation is no better, and perhaps is worse, today than it was then according to an April 2004 article by Los Angeles Times Staff Reporter Ching-Ching Ni. In “Dante's Digital Junkyard,” he describes how Chinese laborers eke out a living using acid, fire, and their bare hands to recycle mountains of electronic scrap, most of it from the United States. (See the full article at [http://ime1.ime.calpoly.edu/Web\\_Entry\\_Point/aunt2/e-trash.htm](http://ime1.ime.calpoly.edu/Web_Entry_Point/aunt2/e-trash.htm)).

Some experts argue that the amount of e-waste exported from the United States will keep growing unless radical changes are adopted. According to a recent article in *China Daily*, the United States exported more than \$1 billion (US dollars) worth of electronic waste to China in 2003 alone. Like many other developing nations, China does not have the infrastructure needed to handle the hazardous material. SVTC tells of computers exported to developing countries being dumped or burned in rice fields, in irrigation canals, or along waterways. The open burning, acid baths, and toxic dumping, says SVTC, pollute the land, air, and water and expose the “men, women, and children of Asia’s poorer peoples to poison.”

In some cases, the export of the e-waste to developing countries violates international law. It also is in violation of some new and forthcoming domestic laws. For example, California Senate Bill 1523 prohibits export of a CRT for disposal to any country where the export of hazardous waste is prohibited by the Basel Convention Ban Amendment. Other states are expected to follow suit and the US government is under increasing pressure to act. Meanwhile, other countries are taking action. Beginning July 1, 2005, China, a major victim of pollution transfer, will levy an electronic trash disposal tax on foreign products, according to a recent article in *China Daily*. China also announced a policy to turn away from its ports any vessel carrying illegal e-waste.

Nonetheless, the amount of e-waste exported from the United States will continue to grow as product obsolescence increases—unless a new mindset is developed that de-emphasizes disposal and focuses first on reuse and then on responsible recycling.

## Note 1

Major corporations must recognize the need to manage the complete lifecycle of electronic products, from purchase to end-of-life, from cradle to grave. It is essential to regard PC recycling as an integral part of their equipment's lifecycle management. Lifecycle can be managed cost-effectively if planned from the acquisition onward. Environmental issues and impacts must be considered from the same lifecycle perspective.

## Why E-Waste Is Exported to Developing Nations

Industrialized market economies like the United States generate the largest portion of all hazardous waste in the world. Disposing of the waste properly is expensive and subject to increasingly close scrutiny.

Exporting the waste to developing countries is a way of avoiding both the cost and the scrutiny. In most of the United States, it is legal to allow export of hazardous e-wastes with no controls whatsoever. A 2003 report issued by the United Nations Economic and Social Council maintained that hazard transfer is dynamic and trying to stop one form just causes new forms to surface. The report cites laws intended to ban the disposal of toxic wastes in developing countries. These laws, argues the report, have led corporations to ship by-products to developing countries for "recycling." But waste trade for recycling typically tends to be "sham recycling," where wastes are burned or dumped, or "dirty recycling," which involves polluting operations. The report also points out that lack of necessary technology makes hazardous waste recycling especially difficult for developing countries.

Economics and profit are major motivators for exporting to developing countries under the name of "recycling:"

- In the United States, e-waste disposal is a fiscal burden placed for the most part on local governments and taxpayers.
- Shipping e-waste to developing countries is much cheaper than responsible recycling in the United States because of cheaper labor and fewer, lax, or not well-enforced offshore environmental and occupational regulations.
- Recyclers shipping unprocessed e-scrap overseas are paid an average of 5 cents per pound net of freight.

Robert Houghton, President and founder of Redemtech, Inc., an outsourcing leader in Technology Change Management (TCM), laments the role played by economics and champions the need for change. Says Houghton: "Right now, many corporations believe the costs to properly recycle electronics outweigh the risks. Until there are tighter rules and more attention paid, companies will be tempted to take the low road. But they need to be aware. Huge fines aside, the bad press may well do irreparable damage to their brand and negatively impact shareholder value."

## The Environmental, Social, and Financial Consequences of Continued Export of E-Waste and Unacceptable Disposal and Recycling

In a recent article in *Computerworld*, senior features editor Robert L. Mitchell quoted Gartner analyst Frances O'Brien as

## Note 2

Growing public awareness of the hazards of e-waste and an increasing number of regulations have increased the pressure to recycle IT products and set the stage for higher costs than those associated with the traditional concept of recycling, which in effect meant disposal. The cost of collection, handling, dismantling and processing for recycling can range from \$10 to \$60 or more per unit for computers. The cost of properly disposing of old computers as hazardous waste can run \$25 to \$60. This is a small price compared with the cost of cleaning up several decades of obsolete computers, which easily could run in the billions.

calling business ignorance about e-waste the “single largest problem for the industry.” Businesses need to be aware that so long as the export of e-waste remains a constant and the dumping of e-waste in general continues to be prevalent, so does the growing attention to the issue by US legislatures.

The EU already has passed key e-waste measures—and, according to the Gartner Group, as of August 2004, 24 new laws were under consideration in the United States at the local and state level. In California, e-waste legislation takes effect this fall, imposing a fee on computer monitors and TVs in order to fund a recycling program. The Resource Conservation and Recovery Act (RCRA) and the California Department of Toxic Substances (CRT Emergency Regulation) prohibit the improper disposal of obsolete computer equipment.

Regulations to protect against toxic e-waste and ban overseas exports are increasing. Public perception of the problem is rising as well, and activist groups are placing vendor practices under greater scrutiny. Organizations such as BAN and SVTC are taking a closer look at the disposal practices of major corporations. Ignorance is ceasing to be a valid excuse for non-compliance or irresponsible disposal. Businesses will not be able to easily excuse their actions—or escape their consequences—by hiding behind immoral practices and paper-thin legal indemnifications. Companies will be accountable for establishing best practices, including proper investigation of vendors and downstream processing, and ensuring an audit trail to prove proper disposal. Those that do not are likely to find themselves plagued by heavy fines, lawsuits, and/or unwanted negative publicity.

## **NEED FOR A HIGHER STANDARD—REUSE FIRST AND RESPONSIBLE RECYCLING LAST**

Based on concern for the two-million-plus tons of used electronics disposed of annually and current disposal rates, the EPA initiated a Plug-In to eCycling program that challenges all Americans to adopt a new resource of conservation ethic.

Eycling is the reuse or recycling of old electronics, and the program encourages the design of more environmentally compatible products, wiser product purchasing, and reuse and recovery of products. Increased reuse and recycling of used electronics and safe and environmentally sound management of electronics are two of the ways the EPA seeks to reach its goal of greater stewardship of electronics.

Programs for properly dealing with current and future e-waste must be built. In “Electronic Waste: A New Challenge for A New Millennium,” a 2001 Environmental Update issued by the Nebraska Department of Environmental Quality, department spokesperson Jim Harford expressed the belief that more than 97 percent of computer

### Note 3

ISO 14001 is an International Standard for Environmental Management Systems (EMS). Currently it is the only ISO 14000 standard against which an organization can be certified by an external certification authority. In brief, ISO 14001 requires that an organization develop and document a method for identifying, controlling, monitoring, and reviewing the ways in which it could or already does interact with the environment.

More specifically, it requires an organization to

- Create and implement an Environmental Management System (EMS) that addresses environmental policy by identifying the organization's commitment to continual improvement, pollution prevention, and compliance with all relevant environmental legislation and regulations
- Identify ways in which it impacts and interacts with the environment, goals for improvement, and all environmentally related legal requirements
- Have in place (1) documented procedures to control and monitor all ways in which the company impacts and interacts with the environment (including emergency preparedness and response) and (2) procedures that monitor and measure key characteristics of operations and activities that may impact the environment
- Have senior management actively participate in reviewing the organization's EMS

contents could be reused or recycled. In Harford's view, that offered "a great opportunity to significantly reduce the amount of e-waste that ends up as trash being sent to our landfills. It is important to think of these items as valuable and reusable, rather than junk." Harford's point is as much on target today as it was then.

Reusing and responsibly recycling electronic equipment provides an environmentally and economically sound alternative to disposal. Reuse conserves the energy and raw materials needed to manufacture new products. This equates to a reduction in toxic and hazardous substances that enter the environment through disposal, as well as in pollution from energy used in the manufacture of new materials. Responsible recycling conserves energy and raw materials as well. And, by allowing metals and plastics to be reclaimed and used in other products, it reduces pollution in manufacturing.

Reuse probably will always be a viable and environmentally sound option. Until electronic products are redesigned to contain non-hazardous materials, recycling will remain a tenable option as well.

### Reuse First

Obsolescence is inevitable at some point in time. However, today there are other options besides disposal that can positively influence return on IT investment. Primary among these is reuse, which plays an important role in diverting waste from landfills, as required by law in a growing number of states.

For forward-thinking companies, reuse should be the environmentally preferable option for managing older electronic equipment. Extending the useful life of old products affords a variety of benefits, including the following:

- **The creation of new jobs and strengthening of the local economy.** According to the Washington, DC-based Institute for Local Self-Reliance, the potential to create new jobs through reuse is great.
- **Cost savings.** Savings are accrued not only on disposal costs but also on the lack of need to purchase new parts or equipment. For example, one Redemtech client saves 65% over new equipment and even more on parts sourcing.
- **Social benefits.** Through charitable donation, individuals, schools, non-profit organizations, and developing countries unable to buy new equipment have the opportunity to make use of secondhand equipment. In developing countries, the aging equipment can contribute to the betterment of education and commerce.
- **Diversion from disposal and its negative human and environmental ramifications.** Electronic equipment such as computers takes up a lot of room in a landfill, leading the landfills to reach capacity more quickly.

#### **Contract with a Professional to...**

- Avoid disposing improperly of electronic equipment. Companies party to improper recycling or disposal are at risk of regulatory fines, bad publicity, and litigation. Engaging a firm familiar with all of these issues can protect your company from potential liabilities.
- Ensure proper storage, record keeping, shipment to waste facilities, and proper handling of end-of-life electronics, which are difficult to manage.
- Ensure access to tracking systems and supply and disposal chain management for recycled materials to ensure transparency and accountability.
- Ensure all applicable governmental regulations are adhered to concerning the environment.

- **Exemption from certain laws.** In some states, such as Massachusetts, electronic equipment earmarked for reuse is exempted to varying degrees from hazardous waste transportation and handling requirements and regulations. Some states are working to reduce or eliminate hazardous waste requirements for these materials.

#### **Responsible and Accountable Recycling**

Some electronic equipment is too old to be reused or is in such bad shape that repair is not an option. Forward-thinking businesses realize maximization of this equipment through responsible and environmentally safe recycling. Computers, monitors, printers, scanners, and other types of electronic equipment contain plastic, glass, steel, aluminum, copper, gold, silver, and other materials that can be reclaimed and used in new products. Tech recycling is comprehensive, taking in demanufacturing, or taking apart, electronic equipment; sorting and cleaning the parts; and turning or having a third-party provider turn the relevant parts into reusable materials for use in manufacturing new products, keeping them from entering the waste stream or endangering the environment.

In the past, some businesses chose not to seek out responsible recyclers to deal with their electronic equipment because of cost. They expected someone to pay them for their obsolete equipment or just haul it away for nothing. One of the results was “sham recycling.” According to the authors of the 2002 “Exporting Harm” report, most companies calling themselves computer and e-waste recyclers often did more waste trading than actual waste recycling. The alternative available today is responsible and properly managed recycling, which typically requires a mix of automated processing and manual labor and carries with it a fee.

Managed recycling is a viable step in responsible and environmentally safe management of e-waste. Unlike improper handling, weak regulation, and “sham” recycling, it will not increase the likelihood of environmental, public, and worker exposure to hazardous materials. And, equally important in today’s corporate world, its best practices approach will help keep both cost and risk low.

Hope for the future came in the form of The Electronic Recycler’s Pledge of True Stewardship. Developed in conjunction with members of Computer Takeback Campaign, including BAN and SVTC, and launched in 2003, it is the world’s most rigorous environmental and social justice criteria for recycling e-waste.

Signatories of the pledge have agreed to prevent hazardous waste from going to municipal incinerators or landfills; prevent the export of hazardous e-waste to developing countries; and use

### Selecting a Recycler

- Check first to make sure the firm meets all applicable state and local regulatory requirements and that it properly manages recovered materials
- Select a recycler that works within an ISO 14001 Certified Environmental Management System
- Make sure the recycler uses refiners, smelters, and other business partners who work within environmental guidelines, have been through due diligence successfully, and are fully vetted for responsible labor and environmental practices
- Select a recycler that does not allow parts or equipment to be landfilled or exported to developing countries
- Verify that the recycler uses clean demanufacturing methods that do not release toxins into the work environment
- Ask the recycler for proof of secured capacity with the appropriate vendors to ensure your organization is not adversely impacted should demand exceed capacity
- Ask the recycler to provide a Warranty of Liability (indemnification)
- Ask to see a sample of the Certificate of Recycling the recycler will provide you for all items processed

free-market rather than prison labor to dismantle or recycle e-waste. Recyclers must submit to close scrutiny, including (evaluation of their recycling practices and downstream accountability, in order to be accepted as a signatory and may be removed from the Pledge list if their compliance is in doubt.

### The Corporate Role

Sophisticated companies, such as Motorola Corporation, Sprint Corporation, and the other eight environmentally progressive companies ranked in the Citizens Advisers Top Ten Corporate Citizens List, have already or are in the process of securing their capacities. Companies need to act sooner rather than later. Those who do not risk not having options or capacity and will find themselves left behind. Measurement programs such as ISO are essential, especially for large corporations and recyclers with whom they contract. The sophisticated companies planning ahead will gain recognition for the level of their social and environmental commitment and can only benefit long-term cost- and reputation-wise.

**Chris Knopp** has 15 years of Operations management experience in the service sector, the last three in Operations supervision and management at Redemtech. Currently he is Compliance Manager for Redemtech with responsibility for environmental compliance.

**Shawn Williams** has close to 12 years of experience in diverse areas of Operations, including inventory, distribution, integration, production, safety, environmental, and quality control. Currently he is Corporate Operations Manager at Redemtech. For the nine years prior to joining Redemtech, he served first as Inventory Manager and then as Operations Manager for a major US technology company.

**Redemtech** is the leading provider of Technology Change Management solutions for large corporations in North America and the European Union. In November 2004 Redemtech will be fully ISO 14001 certified.